Maser Requirements

Hydrogen Maser Frequency Standard for use in VLBI and microwave holography.

Specifications

The unit shall meet the following minimum specifications:

- **Stability (Allan Deviation @ 1Hz bandwidth):**

1 sec	$2.0\ E^{-13}$
10 sec	$5.0\ E^{-14}$
100 sec	$1.3\ E^{-14}$
1000 sec	$3.2\ E^{-15}$

- **Phase Noise:**

	5 MHz	10 MHz
1 Hz	≤ -100 dBc	≤ -94 dBc
10 Hz	≤ -120 dBc	≤ -114 dBc
100 Hz	≤ -135 dBc	≤ -129 dBc
1 KHz	≤ -145 dBc	≤ -139 dBc
10 KHz	≤ -150 dBc	≤ -144 dBc
100 KHz	≤ -155 dBc	≤ -149 dBc

- **Environmental:**

Temperature Sensitivity:	$< 1.0\ E^{-14}$/ ºC
Magnetic Sensitivity:	$< 3.0\ E^{-14}$/Gauss
Power Source Sensitivity:	$< 1.0\ E^{-14}$

- **Power Requirements:**

Operating Voltage:	85 to 264 VAC
Frequency Range:	47 to 63 Hz
Peak Power:	150 W
Operating Power:	75 W typical

- **Frequency Outputs:**

5 MHz:	+13 dBm into 50 Ω (2 each)
10 MHz:	+13 dBm into 50 Ω (2 each)

- **Timing Outputs (1 PPS):**

Quantity:	2 each
Polarity:	Positive going pulse
Amplitude:	> 3 V into 50 Ω
Pulse Width:	20 uSec
Rise Time:	< 3 nSec
Jitter:	< 10 pSec RMS

- **Timing Input:**

Sync Input:	1 PPS
Amplitude:	>3 V into 50 Ω
Pulse Width:	≥ 20 uSec
Rise Time:	< 5 nSec
Jitter:	< 1 nSec RMS

- **Synthesizer:**

Resolution:	$7.0\ E^{-17}$
Range:	$7.0\ E^{-10}$
Phase Coherence:	Continuous throughout frequency range

- **Miscellaneous:**
  - Internal standby batteries capable of eight hours of operation
  - External DC input, 22 to 28 VDC, ~3.1 Amperes typical
  - Synchronization of timing input to timing output < 15 nSec
  - Auto tuning shall require no external frequency reference
  - Provide electronic monitoring of operating parameters